King Saud University
Department of Mathematics
1st Semester 1445 H

MATH 201 (Differential and Integral Calculus)
Second Midterm
Duration: 120 Minutes

Name		ID	

Question Number	I	II	III	IV	Total
Mark					

[I] [5 *Points*]

1. **Compute** the following integral

$$\int_0^2 \int_0^{4-x^2} \frac{xe^{2y}}{4-y}\, dydx$$

---

2. **Sketch** the region R bounded by the graphs of $y = x^2$, $y = 0$ and $x = 2$. Then **evaluate**

$$\iint_R x^3 \cos(xy)\, dA$$

[II] [5 *Points*]

(a) **Find** the **volume** of the solid in the first octant bounded by the graphs of the equations

$$\boldsymbol{z = x^2 + y^2}\text{ , }\boldsymbol{y = 4 - x^2}\text{, }\boldsymbol{y = 0}\text{ and }\boldsymbol{z = 0}$$

(b) **Evaluate** the iterated integral $\int_0^1 \int_{x+1}^{2x} \int_z^{x+z} x \; dydzdx$

[III] [5 *Points*]

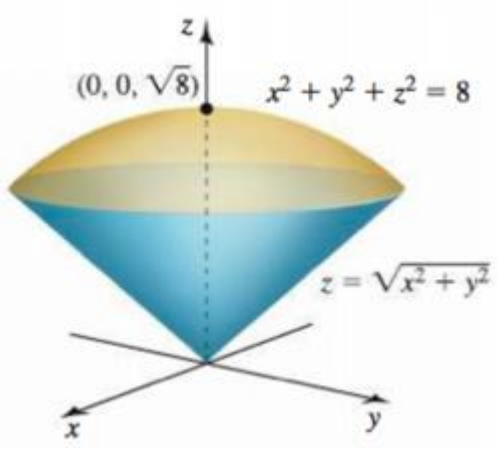
(a) Use **polar coordinates** to **evaluate** the integral

$$\int_0^1 \int_0^{\sqrt{1-x^2}} e^{x^2+y^2}\, dydx$$

(b) Use a **double integral** to **find the area of one loop of** $r = 4\ \sin 3\theta$

[IV] [5 *Points*]

(a) Express, using **triple integral**, the volume of the solid bounded below by the cone $z = \sqrt{x^2 + y^2}$ and bounded above by the sphere $x^2 + y^2 + z^2 = 8$



(b) Determine whether the sequence **converges** or **diverges**

(i) $\left\{1 - \frac{1}{2^n}\right\}_{n=1}^{\infty}$

(ii) $\left\{n \sin\frac{1}{n}\right\}_{n=1}^{\infty}$

(iii) $\{\cos n\pi\}_{n=1}^{\infty}$

Good Luck ☺